

Claims

- [c1] A Land Grid Array (LGA) structure comprising:
 - a chip carrier,
 - at least one bottom surface contact pad on a bottom surface of said chip carrier, and
 - at least one micro-bump on said at least one bottom surface contact pad.
- [c2] The Land Grid Array (LGA) structure of claim 1 further comprising:
 - a circuit board having at least one circuit board contact pad, and at
 - least one fuzz button disposed between and in contact with said at least one bottom surface contact pad and said at least one circuit board contact pad.
- [c3] The Land Grid Array (LGA) structure of claim 2 wherein said at least one bottom surface contact pad and micro-bump are comprised of copper, nickel and gold.
- [c4] The Land Grid Array (LGA) structure of claim 2 wherein said at least one bottom surface contact pad and micro-bump are comprised of molybdenum, nickel and gold.

[c5] The Land Grid Array (LGA) structure of claim 2 wherein said at least one micro-bump is circular with a base diameter ranging from approximately 100 μ m to 250 μ m with height ranging from approximately 30 μ m to 50 μ m .

[c6] The Land Grid Array (LGA) structure of claim 2 wherein said at least one bottom surface contact pad has a plurality of said micro-bumps uniformly and symmetrically distributed.

[c7] The Land Grid Array (LGA) structure of claim 6 wherein the diameter and height of said plurality micro-bumps have a variation of less than approximately 10 μ m.

[c8] The Land Grid Array (LGA) structure of claim 2 further comprising:
an interposer holding said at least one fuzz button and configured to the geometry and pitch of said at least one bottom surface contact pad and said at least one circuit board contact pad.

[c9] An electrical contact pad comprising:
a conductive contact pad, and
at least one micro-bump on said at least one contact pad.

[c10] The electrical contact pad of claim 9 wherein said conductive contact pad and at least one micro-bump are

comprised of copper, nickel and gold.

- [c11] The electrical contact pad of claim 9 wherein said conductive contact pad and at least one micro-bump are comprised of molybdenum, nickel and gold.
- [c12] The electrical contact pad of claim 9 wherein said at least one micro-bump is circular with a base diameter ranging from approximately 100 μ m to 250 μ m with height ranging from approximately 30 μ m to 50 μ m.
- [c13] The electrical contact pad of claim 9 wherein said conductive contact pad has a plurality of said micro-bumps uniformly and symmetrically distributed.
- [c14] The electrical contact pad of claim 13 wherein the diameter and height of said plurality micro-bumps have a variation of less than approximately 10 μ m.
- [c15] A method for creating micro-bumps on metal contact pads comprising the steps of:
providing a plurality of glass ceramic greensheets,
stacking said plurality of glass ceramic greensheets, said stack of glass ceramic greensheets having a bottom surface glass ceramic greensheet layer containing bottom surface metal contact pads,
providing an alumina contact sheet having through holes, said through holes configured to the location and

pitch of the desired micro-bumps,
placing said alumina contact sheet in contact with said bottom surface glass ceramic greensheet layer such that said through holes coincide with said bottom surface metal contact pads,
laminating said stack of glass ceramic greensheets and contact sheet to create a laminate and form micro-bumps on said bottom surface metal contact pads by extrusion of metal on said bottom surface metal contact pads into said through holes.

[c16] The method of claim 15 further comprising the steps of :
sintering said laminate to form a glass ceramic chip carrier, and
removing said contact sheet from said glass ceramic chip carrier thereby exposing said micro-bumps on said bottom surface metal contact pads.

[c17] The method of claim 15 wherein said alumina contact sheet is pre-punched with circular through holes approximately 50 μ m to 300 μ m in diameter.

[c18] The method of claim 17 wherein said circular through holes are punched in a symmetrical pattern.

[c19] The method of claim 15 wherein said alumina contact sheet has a thickness of approximately 150 μ m to

250µm.

- [c20] A method for creating micro-bumps on metal contact pads comprising the steps of:
- providing a plurality of alumina ceramic greensheets,
 - stacking said plurality of alumina ceramic greensheets,
 - said stack of alumina ceramic greensheets having a bottom surface alumina ceramic greensheet layer containing bottom surface metal contact pads,
 - providing a metal plate having through holes, said through holes configured to the location and pitch of the desired micro-bumps,
 - placing said metal plate in contact with said bottom surface alumina ceramic greensheet layer such that said through holes coincide with said bottom surface metal contact pads,
 - laminating said stack of alumina ceramic greensheets and metal plate to create a laminate and form micro-bumps on said bottom surface metal contact pads by extrusion of metal on said bottom surface metal contact pads into said through holes.
- [c21] The method of claim 20 further comprising the steps of :
- removing said metal plate from said alumina ceramic chip carrier thereby exposing said micro-bumps on said bottom surface metal contact pads, and
 - sintering said laminate to form an alumina ceramic chip

carrier.

- [c22] The method of claim 20 where said metal plate is pre-drilled with circular through holes approximately 50µm to 300µm in diameter.
- [c23] The method of claim 21 where said circular through holes are punched in a symmetrical pattern.
- [c24] The method of claim 20 where said metal plate has a thickness of approximately 150µm to 250µm.